

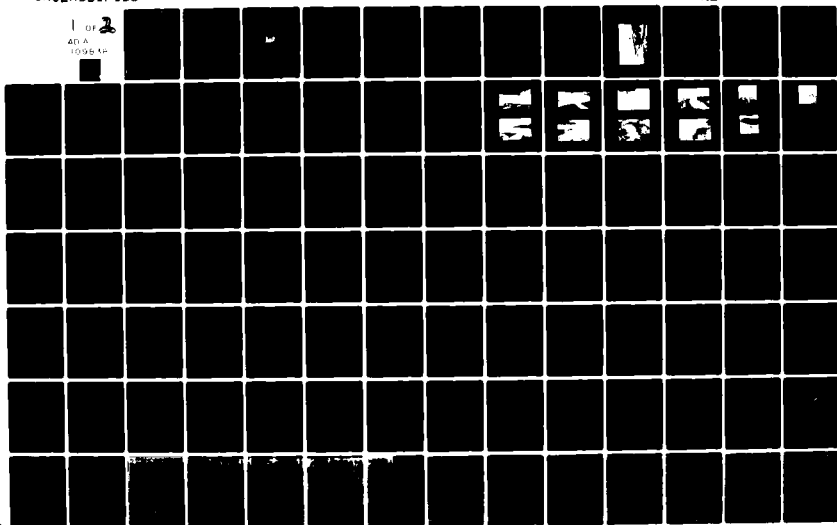
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NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13  
NATIONAL DAM SAFETY PROGRAM. GOSHEN RESERVOIR NUMBER 1 DAM (INV--ETC(U)  
AUG 81 G KOCH DACW51-79-C-0001

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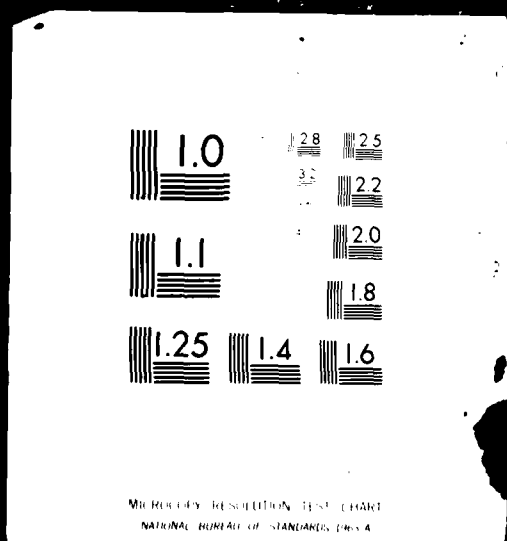
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### 3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the investigation reveal

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REPORT DOCUMENTATION PAGE		LEVEL	AD INSTRUCTIONS FOR COMPLETING FORM
1. REPORT NUMBER  AD-A 109838	2. GOVT ACCESSION NO.	3. REPORT NUMBER	4. REPORT NUMBER'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Goshen Reservoir No. 1 Dam Lower Hudson River Basin, Orange County, NY Inventory No. NY00488		5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program	
7. AUTHOR(s)  GEORGE KOCH		6. PERFORMING ORG. REPORT NUMBER	
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11. CONTROLLING OFFICE NAME AND ADDRESS Department of the Army 26 Federal Plaza New York District, CofE New York, New York 10287		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.  The examination of documents and the visual inspection of the Goshen Reservoir did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some problem areas which require additional studies and remedial work.			

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The most serious of these deficiencies are the two areas of seepage on the downstream slope of the dam. First is at the end of the grouted stone spillway channel and the second is at the toe in the center of the dam. It is recommended that within six months from notification, an engineering investigation is initiated to determine the sources of the seepage found.

Using the Corps of Engineers' "screening criteria" for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped for all storms in excess of 51% of the Probable Maximum Flood (PMF). Therefore, the spillway is adjudged as "inadequate".

**LOWER HUDSON RIVER BASIN**  
**GOSHEN RESERVOIR NO. 1 DAM**  
**ORANGE COUNTY, NEW YORK**  
**INVENTORY NO. N.Y. 488**  
**PHASE I INSPECTION REPORT**  
**NATIONAL DAM SAFETY PROGRAM**



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**NEW YORK DISTRICT CORPS OF ENGINEERS**

**AUGUST, 1981**

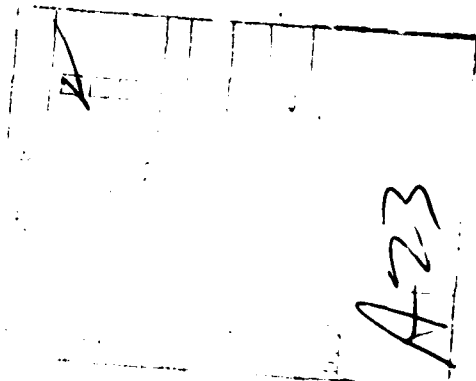
## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.



PHASE I INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
GOSHEN RESERVOIR NO.1 DAM  
I.D. NO. NY 488  
D.E.C. NO. 179B-3163  
LOWER HUDSON RIVER BASIN  
ORANGE COUNTY, N.Y.

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**PHASE 1 INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM**

Name of Dam:	Goshen Reservoir No. 1 Dam (I.D. No. NY 488)
State Located:	New York
County Located	Orange
Stream:	Rio Grande Creek
Date of Inspection:	November 20, 1980

**ASSESSMENT**

The examination of documents and the visual inspection of the Goshen Reservoir did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some problem areas which require additional studies and remedial work.

The most serious of these deficiencies are the two areas of seepage on the downstream slope of the dam. First is at the end of the grouted stone spillway channel and the second is at the toe in the center of the dam. It is recommended that within six months from notification, an engineering investigation is initiated to determine the sources of the seepage found.

Using the Corps of Engineers' "screening criteria" for the initial review of spillway adequacy, it has been determined that the embankment would be overtopped for all storms in excess of 51% of the Probable Maximum Flood (PMF). Therefore, the spillway is adjudged as "inadequate".

In addition the dam has a number of problem areas, which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within 1 year. The following remedial work is required:

- a. Repair the spillway walls.
- b. Clean and recaulk the joints in the spillway.
- c. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including operation and lubrication of all gates and valves. This information should be documented for future reference.
- d. An emergency action plan must be established.

George Koch  
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New York State Department  
of Environmental Conservation  
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Approved By:

W. H. Smith, Jr.  
Col. W.H. Smith, Jr.  
New York District Engineer

Date:

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OVERVIEW OF GOSHEN RESERVOIR #1 DAM

PHOTO #1

PHASE 1 INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
GOSHEN RESERVOIR NO. 1 DAM I.D. NO. NY 488  
DEC # 179 B - 3163 LOWER HUDSON RIVER BASIN  
ORANGE COUNTY

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

Evaluation of the existing conditions of the subject dam to identify deficiencies and hazardous conditions, determine if they constitute hazards to human life and property and recommend remedial measures where necessary.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances

The Goshen Reservoir No. 1 Dam consists of a 550 feet long earth embankment with a 25 feet concrete overflow spillway located at the left abutment. The original embankment was raised 4 feet in 1963 to its present height of 37 feet. The rip rap protected upstream slope is 3-on 1, while the downstream slope was backfilled to a 2 on 1 grade. The crest width is 12', but there has been fill placed on the downstream slope in the recent past, increasing the crest width to 20' in the area adjacent to the access road. The gate house is located on the upstream slope on the right side of the embankment. It houses two 20" intake valves to the Goshen water supply system. The spillway is a concrete channel with a concrete cutoff extending into the embankment. The outlet channel is grouted stone channel which follows the abutment contact and bends back into the original stream bed. There is no reservoir drain except for the intake lines to the filtration plant.

b. Location

The dam is located on the Rio Grande Creek, a tributary of the Wallkill River, Lower Hudson River Basin. It is in the Town of Goshen, Orange County, State of New York.

c. Size

The dam is approximately 37 feet high and impounds 704. acre feet at normal or spillway crest elevation. The dam is classified as "small" in size (25 to 40 feet in height).

d. Hazard Classification

The dam is classified as high hazard due to its location above several homes along Reservoir Road.

e. Ownership

The dam is owned by the Village of Goshen, New York. The owner's representative is Conrad Kroll, Superintendent of Public Works, Village of Goshen, 276 Main Street, Goshen, NY 10924, (914) 294-6750.

f. Purpose of the Dam

The dam augments the storage of the Village of Goshen water supply.

g. Design and Construction History

The original dam was constructed around 1875. In 1964 the embankment was raised 4 feet and a new spillway was constructed. The design of the reconstruction was by Chumark & McGough, Consulting Engineers, Middletown, New York.

h. Normal Operating Procedures

Releases from the Goshen Reservoir are normally passed into the treatment plant and into the water supply system. Excess runoff is passed over the spillway and into the original stream channel.

1.3 PERTINENT DATA

a. Drainage Area (sq. mi.)

0.59

b. Elevations (ft. USGS datum)

Top of Dam	546.0
Spillway Crest	543.0
Original Stream Channel	509.0

c. Reservoir (acre feet)

Storage at Top of Dam	867.0
Storage at Spillway Crest	704.0

d. Dam

Type: Homogeneous earth fill with a clay addition to the top of the embankment, upstream slope is rip rapped.

Length (ft):	550.0
Downstream Slope:	2:1
Upstream Slope:	3:1
Crest Width (ft):	12.
Height (ft):	37.

e. Spillway

Type: Concrete channel with concrete cutoff wall and grouted stone outlet channel.

Weir Length (ft):	25.0'
Maximum Capacity (cfs):	236.

5-8

## SECTION 2: ENGINEERING DATA

### 2.1: DESIGN

#### a. Geology

The Goshen Reservoir No. 1 Dam is located in the "Hudson Valley Lowlands" physiographic province of New York State. These lowland areas have gentle relief and are underlain by Ordovician shales that have been exposed by the erosion of overlying Silurian and Devonian limestones. Drainage is generally northeast towards the Hudson River.

#### b. Subsurface Investigation

The Troy-Cossayuna is the dominant association of the glacial till of the Hudson Valley (Ref. 8). The only information or past investigation of the site that could be located are the boring logs included in the report. These are borings through the original dam embankment taken for the design of the raising embankment.

#### c. Dam and Appurtenant Structures

There is no data on the original structure except what can be interpreted from the reconstruction plans (App. E). The reconstruction was designed by Chumard and McGough, Consulting Engineers in 1963 and believed to be implemented the same year.

### 2.2 CONSTRUCTION RECORDS

Some correspondence regarding seepage and some settlement problems were located in the files located in the Dam Safety Section, Department of Environmental Conservation, 50 Wolf Road, Albany, NY 12233. Several of the reconstruction photos are included in this report (See App. A).

### 2.3 OPERATION RECORD

All information regarding operation and maintenance of the dam is on file with the Goshen Water Superintendent.

### 2.4 EVALUATION OF DATA

The data presented in this report is compiled from information made available by the representatives of the Village of Goshen and the files at Department of Environmental Conservation. This information appears to be adequate and reliable for Phase 1 Inspection purposes.

### SECTION 3: VISUAL INSPECTION

#### 3. 1: FINDINGS

##### a. General

Visual inspection of the Goshen Reservoir No. 1 dam and surrounding watershed was conducted on November 20, 1980 and April 30, 1981. The weather was clear and the temperature ranged in the thirties; there was approximately 2 inches of snow on the ground in November and clear of snow in April. The reservoir was approximately 4 feet below normal or spillway crest elevation.

##### b. Dam

The dam, which was raised in 1963 is approximately 37 feet high. It is composed of an earth embankment with a concrete spillway. The upstream rip rap was well placed and in good condition, and the embankment as a whole appeared stable. However, there were several points of seepage on the downstream slope, emanating from under the grouted spillway channel and a wet area at the toe, in the center of the dam. This seepage was also found during and after construction in 1964 (See photos, App. A), and suspected to be flowing in the area of the original spillway. The seepage did not show signs of material transport. The Department of Public Works has been placing fill material on the downstream slope adjacent to the access road. This has widened the crest by 10 feet in this area of the dam.

##### c. Spillway

As evidenced in the construction photos settlement of the embankment was large. This movement is apparent in the spillway. Both walls are cracked and the right wall has moved inward. The construction joints are showing signs of deterioration, much of the compound is missing. The grouted stone channel is in good condition, however, there was a small amount of seepage emanating from under the channel.

##### d. Appurtenant Structures

The gate house was raised in 1963 with the embankment and appears to be sound. All gates are operated continually and in good working condition.

##### e. Abutments

There is no sign of seepage or other unusual conditions at the abutments, however, the right abutment is concealed by the backfilling on the downstream slope of the dam.

##### f. Downstream Channel

The channel downstream of the spillway is natural, stream bed upon leaving the grouted stone spillway channel. Although the channel contains natural vegetation, including large trees and brush, its present condition would not significantly impede discharges from the spillway.

##### g. Reservoir Area

In the vicinity of the dam there is no evidence of sloughing, potentially unstable slopes or other unusual conditions which may adversely affect the dam. No evidence of excessive sedimentation was observed.

### 3.2 EVALUATION OF OBSERVATIONS

Visual observations made during the course of the investigation reveal several deficiencies which should be corrected before further deterioration leads to a hazardous condition. They are;

- a. Determine the source of the seepage found at the toe and the center of the dam and at the end of the grouted spillway channel. Monitor the seepage at bi-weekly intervals with the aid of weirs.
- b. Repair the spillway walls.
- c. Clean and recaulk joints in the spillway.
- d. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including operation and lubrication of all gates and valves. This information should be documented for future reference.
- e. An emergency action plan must be established.



## SECTION 4: OPERATIONS AND MAINTENANCE PROCEDURES

### 4.1 PROCEDURES

The normal water surface is at the spillway crest. The reservoir is kept at or below this elevation by discharge through the two 20" lines into the Goshen Water Supply. Flows in excess of this requirement are passed over the ungated spillway.

### 4.2 MAINTENANCE OF THE DAM

Maintenance of the dam is provided by the owner, the Village of Goshen, NY. Maintenance of the dam is considered unsatisfactory, as evidenced by the cracking of concrete elements, deteriorated concrete joints, and unmonitored seepage.

### 4.3 WARNING SYSTEM

There is no warning system in effect or in preparation.

### 4.4 EVALUATION

The dam has not been maintained in satisfactory condition as noted in "Section 3: Visual Inspection".

## SECTION 5: HYDROLOGIC/HYDRAULIC

### 5.1 DRAINAGE AREA CHARACTERISTICS

The total drainage area tributary to this dam is 0.59 square miles with generally moderate slopes. The area is fairly well drained and was treated as a single basin for analysis purposes.

### 5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of the dam and storage of the reservoir was performed using the Corps of Engineers HEC-1 computer program incorporating the "Snyder Synthetic Unit Hydrograph" method and the "Modified Puls" flood routing procedure. The floods selected for analysis were the PMF and 1/2 PMF in accordance with the recommended guidelines of the Corps of Engineers.

### 5.3 SPILLWAY CAPACITY

The spillway has a capacity of 343 cfs with the reservoir level at the top of the dam. For the 1/2 PMF the peak inflow will be 895 cfs and the peak outflow will be 338 cfs. For the PMF the peak inflow will be 1789 cfs and the peak outflow will be 1466 cfs. During this event, the dam will be overtopped by 0.89 foot of water.

### 5.4 RESERVOIR CAPACITY

Capacity to normal water elevation is 704 acre-feet. Surge storage to top of dam is an additional 163 acre-feet, creating a total storage of 867 acre-feet. The surge storage between spillway and dam crest is equivalent to 5.18 inches of runoff.

### 5.5 FLOODS OF RECORD

No records of past floods for Rio Grande Creek are available.

### 5.6 OVERTOPPING POTENTIAL

Our analysis indicates the dam will be overtopped by 0.89 foot during the PMF which could cause damages to several homes located downstream. It would, however, be able to handle 1/2 the PMF but with practically no freeboard (about 0.03 feet).

### 5.7 EVALUATION

The spillway is inadequate to pass all floods exceeding 51% of the PMF and is, therefore, adjudged as "inadequate".

## SECTION 6: STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

The most serious signs of distress in connection with the earth embankment are the seepage areas previously noted. There are a number of other problem areas, discussed in "Section 3: Visual Inspection", which if left uncorrected, have the potential for the development of hazardous conditions.

#### b. Design and Construction Data

Some information on the problems resulting from the 1963 reconstruction is available in the NYS Department of Environmental Conservation files. No data was available on the original structure, but plans and photos of the reconstruction are included in this report.

#### c. Post Construction Changes

The original dam was constructed about 1875 and raised in 1963 to its present configuration. The last raising was designed by Chumard and McGough, Consulting Engineers, Middleton, NY.

## SECTION 7: ASSESSMENT/RECOMMENDATIONS

### 7.1 ASSESSMENT

#### a. Safety

The Phase 1 Inspection of Goshen Reservoir No. 1 Dam revealed that the spillway as "inadequate" based on the Corps of Engineer's "screening criteria". The dam will be overtopped by all storms in excess of 51% of the PMF. Also several areas of seepage were found at the spillway channel outlet and at the toe of the dam. These areas must be investigated to determine the source of this seepage and what remedial action must be initiated.

#### b. Adequacy of Information

The information reviewed is considered adequate for Phase 1 Inspection purposes.

#### c. Need for Additional Investigations

There is need for a further engineering investigation into the seepage found at the toe of the embankment and at the end of the spillway channel. After these investigations have been completed, appropriate remedial measures must be initiated.

#### d. Urgency

The engineering investigations must be initiated within six months from the date of notification, and remedial measures as a result of these investigations completed within 18 months from the date of notification. In the interim monitor the seepage area on a regular basis, develop an emergency action plan for notification of downstream residents and the proper governmental authorities, and provide around-the-clock surveillance of the dam during periods of unusually heavy runoff. The other repairs and maintenance noted in Section 3.2 must be complete within one year from the date of notification.

### 7.2 RECOMMENDED MEASURES

- a. Initiate an engineering study to determine the source of the seepage found on the dam and determine a method of treatment. Monitor this seepage at biweekly intervals with the aid of weirs.
- b. Repair the spillway walls.
- c. Clean and recaulk the joints in the spillway.
- d. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including operation and lubrication of all gates and valves. This information should be documented for future reference.
- e. An emergency action plan must be established.

In addition, the dam has a number of problem areas, which if left uncorrected, have the potential for the development of hazardous conditions and must be corrected within one year. These areas are:

1. Monitor seepage in the spillway and outlet conduit. If significant increases are observed, investigate and repair.
2. Monitor the calcification of the outlet conduit construction joints and repair as required.
3. Repoint all joints of the masonry construction. Recaulk all construction joints where necessary.
4. Repair the deteriorated stoplog brackets.
5. Remove the debris in the spillway area, outlet conduit and downstream channel.
6. Remove the tree and brush growth on the embankment and in the downstream channel. Provide a program of periodic cutting and mowing.
7. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference. Also develop an emergency action plan.

APPENDIX A

PHOTOGRAPHS



PHOTO # 2: DOWNSTREAM SLOPE AT EMBANKMENT



PHOTO #3: SPILLWAY LOCATED AT LEFT ABUTMENT

NOTE CRACK IN WALL



PHOTO #4: LEFT SPILLWAY WALL  
NOTE CRACK ABOVE FISH SCREEN



PHOTO #5: BACKFILLED AREA ON DOWNSTREAM SLOPE  
RESULTING IN WIDENED CREST





PHOTO #6: SPILLWAY CHANNEL  
BELOW COBBLE PAVED CHANNEL

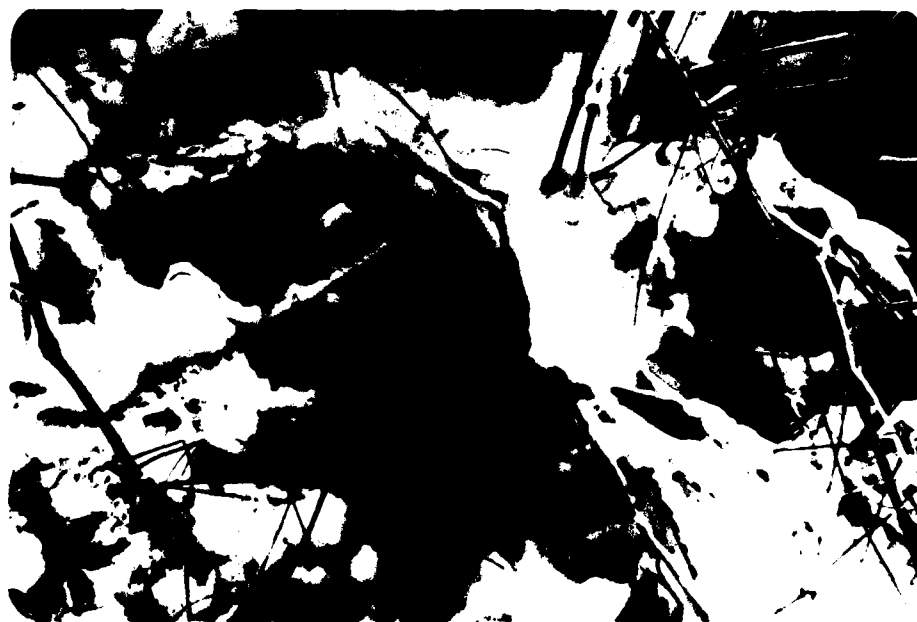
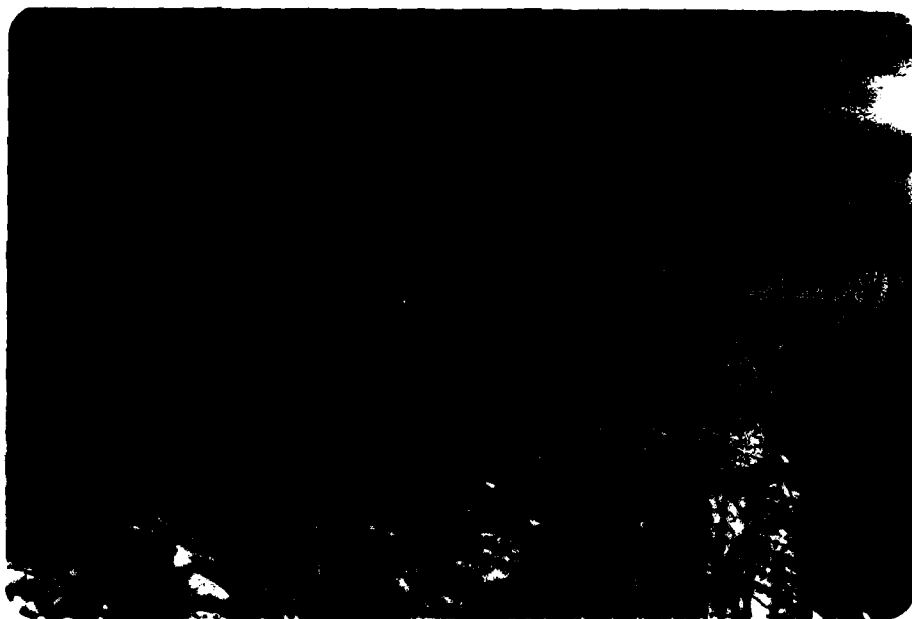


PHOTO #7: SEEPAGE AT END OF SPILLWAY CHANNEL



PHOTO # 8: GATE HOUSE LOCATED AT RIGHT ABUTMENT



PHTOT # 9: RESERVOIR FROM CREST OF DAM



PHOTO # 10: SETTLEMENT DURING RECONSTRUCTION OF DAM IN 1963



PHOTO # 11: SEEPAGE AT END OF SPILLWAY CHANNEL

1963



PHOTO # 12: SEEPAGE AT TOE IN SAME GENERAL  
AREA AS WAS FOUND DURING PHASE I INSPECTION  
PHOTO TAKEN IN 1963

APPENDIX 8

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST1) Basic Data

## a. General

Name of Dam GOSHEN RESERVOIR  
Fed. I.D. # NY 488 DEC Dam No. 179 B - 3163  
River Basin LOWER HUDSON  
Location: Town GOSHEN County ORANGE  
Stream Name RIO GRANDE CREEK  
Tributary of WALKILL RIVER  
Latitude (N) 41° 23.0' Longitude (W) 74° 20.0'  
Type of Dam EARTH FILL  
Hazard Category 'C' high  
Date(s) of Inspection NOVEMBER 20, 1980 / APRIL 30, 1981  
Weather Conditions SNOWY 30's / clear 30's  
Reservoir Level at Time of Inspection 4 feet below spillcrest

b. Inspection Personnel KEN HARMER, JAMIE VEITCH

c. Persons Contacted (Including Address & Phone No.)  
MR. CONRAD KROLL, SUPERINTENDENT  
276 MAIN STR.  
GOSHEN NY 10929  
(914) 294-6750

## d. History:

Date Constructed 1875 Date(s) Reconstructed 1964  
Designer Chumark & McGough, Middletown NY  
Constructed By —  
Owner Village of GOSHEN

93-15-3(9/80)

2) Embankment

## a. Characteristics

- (1) Embankment Material EARTH/CLAY FILL
- (2) Cutoff Type NONE
- (3) Impervious Core CLAYFILL
- (4) Internal Drainage System NONE
- (5) Miscellaneous backfilled on downstream slope.

## b. Crest

- (1) Vertical Alignment good
- (2) Horizontal Alignment good
- (3) Surface Cracks NONE
- (4) Miscellaneous —

## c. Upstream Slope

- (1) Slope (Estimate) (V:H) 1:3
- (2) Undesirable Growth or Debris, Animal Burrows NONE
- (3) Sloughing, Subsidence or Depressions NONE

(4) Slope Protection rip rap - well placed good condition

(5) Surface Cracks or Movement at Toe None apparent

d. Downstream Slope

(1) Slope (Estimate - V:H) ORIGINAL 1:2, presently backfill to slightly steep

(2) Undesirable Growth or Debris, Animal Burrows brush & tree growth

(3) Sloughing, Subsidence or Depressions —

(4) Surface Cracks or Movement at Toe —

(5) Seepage several points of seepage at toe and from under spillway channel

(6) External Drainage System (Ditches, Trenches; Blanket) none

(7) Condition Around Outlet Structure None

(8) Seepage Beyond Toe None

e. Abutments - Embankment Contact

good



93-15-3(9/80)

(1) Erosion at Contact None(2) Seepage Along Contact None3) Drainage Systema. Description of System gravel/tile under drain under  
the spillway channel

b. Condition of System \_\_\_\_\_

c. Discharge from Drainage System SMALL AMOUNT  $\approx$  0.5 gal/min4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs,  
Piezometers, Etc.) \_\_\_\_\_

93-15-3(9/80)

5) Reservoir

- a. Slopes stable, shallow
- b. Sedimentation SOME, NO PROBLEM
- c. Unusual Conditions Which Affect Dam NONE

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) SEVERAL HOMES.  
just downstream (1/4 mi) on Reservoir Rd.
- b. Seepage, Unusual Growth WET AREAS CAUSED BY SEEPAGE
- c. Evidence of Movement Beyond Toe of Dam NONE
- d. Condition of Downstream Channel heavily treed

7) Spillway(s) (Including Discharge Conveyance Channel)

- a. General in need of maintenance
- b. Condition of Service Spillway movement apparent, cracking joints deteriorated.

c. Condition of Auxiliary Spillway

N/A

d. Condition of Discharge Conveyance Channel

grouted channel  
in good condition8) Reservoir Drain/OutletN/A

Type: Pipe \_\_\_\_\_ Conduit \_\_\_\_\_ Other \_\_\_\_\_

Material: Concrete \_\_\_\_\_ Metal \_\_\_\_\_ Other \_\_\_\_\_

Size: \_\_\_\_\_ Length \_\_\_\_\_

Invert Elevations: Entrance \_\_\_\_\_ Exit \_\_\_\_\_

Physical Condition (Describe): \_\_\_\_\_ Unobservable \_\_\_\_\_

Material: \_\_\_\_\_

Joints: \_\_\_\_\_ Alignment \_\_\_\_\_

Structural Integrity: \_\_\_\_\_

Hydraulic Capability: \_\_\_\_\_

Means of Control: Gate \_\_\_\_\_ Valve \_\_\_\_\_ Uncontrolled \_\_\_\_\_

Operation: Operable \_\_\_\_\_ Inoperable \_\_\_\_\_ Other \_\_\_\_\_

Present Condition (Describe): \_\_\_\_\_

9) Structural

- a. Concrete Surfaces gate house / INTAKE STRUCTURE —  
good
- b. Structural Cracking spillway
- c. Movement - Horizontal & Vertical Alignment (Settlement) spillway
- d. Junctions with Abutments or Embankments —
- e. Drains - Foundation, Joint, Face
- f. Water Passages, Conduits, Sluices None
- g. Seepage or Leakage at toe & from spillway underdrain

- h. Joints - Construction, etc. spillage - deteriorated
- i. Foundation no apparent problem
- j. Abutments good
- k. Control Gates operational (to water supply only)
- l. Approach & Outlet Channels good
- m. Energy Dissipators (Plunge Pool, etc.) None
- n. Intake Structures good
- o. Stability good
- p. Miscellaneous

10) Appurtenant Structures (Power House, Lock, Gatehouse, Other)

a. Description and Condition gate house intake good  
condition

11) Operation Procedures (Lake Level Regulation):

water supply fluctuations.

APPENDIX C

HYDROLOGIC / HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

# GOSHEN RESERVOIR

## Spillway Capacity

Top of Dam - 546.0

Streambed = 507.

Spillway Crest - 543.0

$L_{weir} = 25'$  1.5' fish screen assume full

$C = 2.64$  (KING & BRATER; 5.3)

EL.	H.	C	Q
543.3	0	2.64	0
543.5	.5		23.
544.0	1.0		66.
544.5	1.5		121.
545.0	2.0		187.
545.5	2.5		261.
546.0	3.0	2.64	343.

## Reservoir Capacity

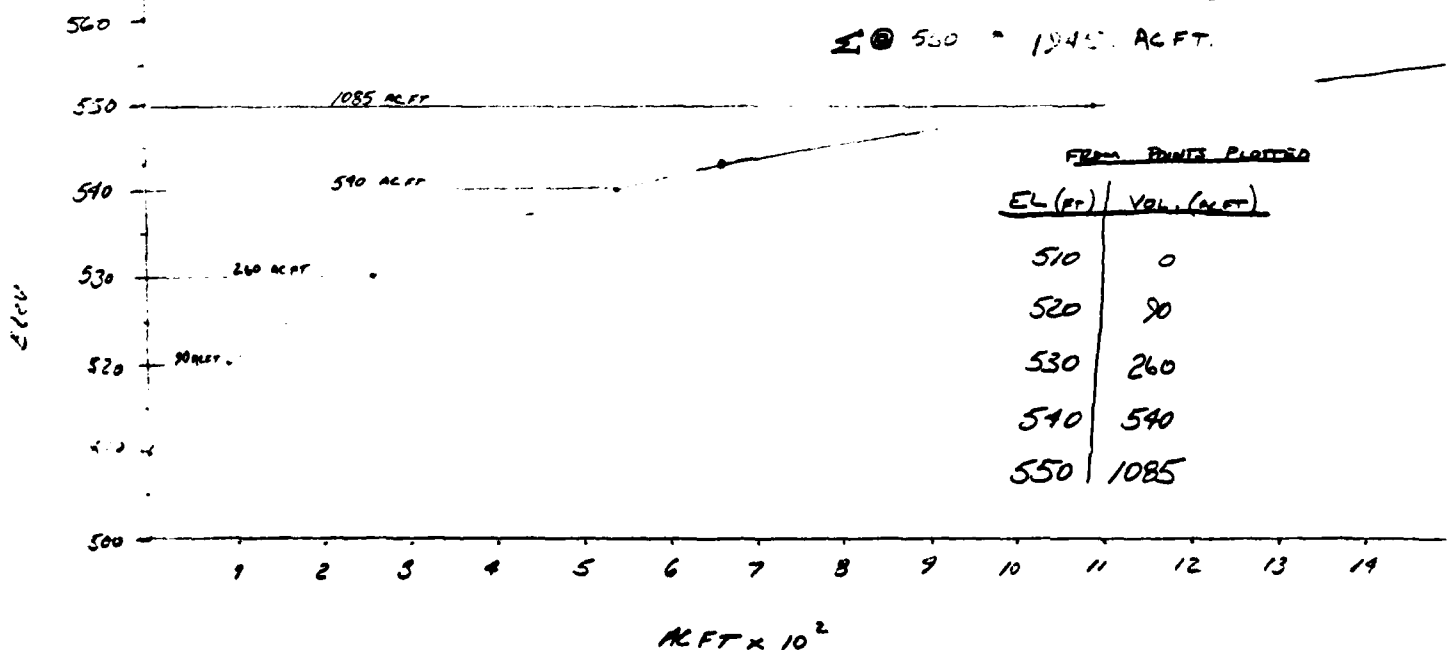
Volume  $215 \times 10^6$  gal @ 543.0 = 661.4 AC FT. (USE FIGURE FROM DEVELOPED CURVE 704 AC FT.)

Area 500 = 108 AC IN.  $\frac{543.0 - 500}{543.0 - 500} = 98$  ACRES

543 = 52 ACRES

$Vol = \left( \frac{98 + 52}{2} \right) 17 = 1233.5$  AC FT

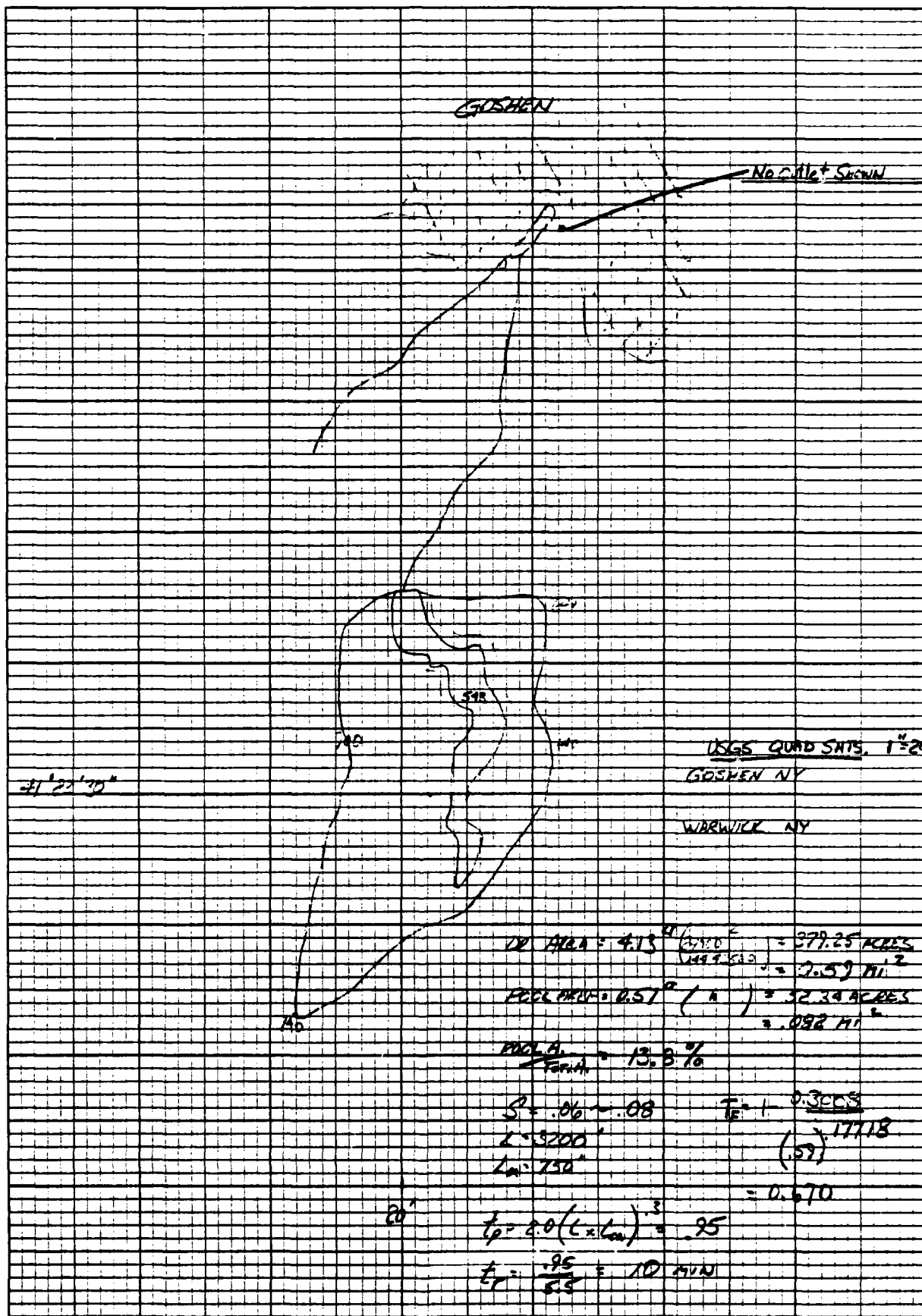
$\Sigma @ 500 = 1945$  AC FT.





46 0782

K-E 10 X 10 TO THE INCH = 7 X 10 INCHES  
KEUFFEL & ESSER CO. MADE IN U.S.A.



GASHEN

cont.

PRECIPITATION

$$\Sigma(PMP) = 21.5'' \quad \begin{array}{cccc} \text{DUE} \rightarrow & 6 & 12 & 24 & 48 \\ \% \rightarrow & 111 & 123 & 133 & 142 \end{array}$$

$$L = 3200'$$
$$L_a = 750'$$

$$DA = 0.59 \text{ mi.}^2$$

$$\text{POOL AREA} = .08 \text{ mi.}^2$$

$$t_p = 0.95 \text{ hr.} \quad T_p = .95 + .25(.17 - .17) = .95 \text{ hr.} \quad \text{USE } T_p = .90 \text{ hr}$$
$$t_r = 10 \text{ MIN} \quad t_r = 10 \text{ MIN}$$

$$\text{TRANSPOSITION FACTOR} = 1 - \frac{0.3008}{(.59)^{0.17718}} = 0.67$$

USE SINGLE BASIN ANALYSIS w/ shortened  $T_p$  MORE  
CONSERVATIVE RUNOFF COMBINED RUNOFF AND DIRECT INFLOW

CHECK LIST FOR DAMS  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>546.0</u>	<u>          </u>	<u>867.0</u>
2) Design High Water (Max. Design Pool)	<u>NA</u>	<u>          </u>	<u>          </u>
3) Auxiliary Spillway Crest	<u>NA</u>	<u>          </u>	<u>          </u>
4) Pool Level with Flashboards	<u>NA</u>	<u>          </u>	<u>          </u>
5) Service Spillway Crest	<u>543.0</u>	<u>          </u>	<u>704.0</u>

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u>1.2</u>
2) Spillway @ Maximum High Water	<u>          </u>
3) Spillway @ Design High Water	<u>NA</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>NA</u>
5) Low Level Outlet	<u>NA</u>
6) Total (of all facilities) @ Maximum High Water	<u>          </u>
7) Maximum Known Flood	<u>          </u>
8) At Time of Inspection	<u>          </u>

CREST:

ELEVATION: 546.0Type: Compacted earthWidth: 12'Length: 550'

Spillover \_\_\_\_\_

Location \_\_\_\_\_

SPILLWAY:

SERVICE

AUXILIARY

543.0

Elevation \_\_\_\_\_

Concrete channel

Type \_\_\_\_\_

25'

Width \_\_\_\_\_

Type of Control

✓

Uncontrolled \_\_\_\_\_

Controlled: \_\_\_\_\_

Type \_\_\_\_\_

(Flashboards; gate) \_\_\_\_\_

Number \_\_\_\_\_

Size/Length \_\_\_\_\_

Invert Material \_\_\_\_\_

Anticipated Length  
of operating service \_\_\_\_\_

Chute Length \_\_\_\_\_

Height Between Spillway Crest  
& Approach Channel Invert  
(Weir Flow) \_\_\_\_\_

## HYDROMETEROLOGICAL GAGES:

Type : None

Location: \_\_\_\_\_

Records:

Date - \_\_\_\_\_

Max. Reading - \_\_\_\_\_

## FLOOD WATER CONTROL SYSTEM:

Warning System: None

Method of Controlled Releases (mechanisms):

None except for two 20" intake lines into  
the filtration plant.

DRAINAGE AREA: 0.59 mi<sup>2</sup>

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: \_\_\_\_\_

Terrain - Relief: \_\_\_\_\_

Surface - Soil: \_\_\_\_\_

Runoff Potential (existing or planned extensive alterations to existing  
(surface or subsurface conditions)

No alterations planned or anticipated

Potential Sedimentation problem areas (natural or man-made; present or future)

Potential Backwater problem areas for levels at maximum storage capacity  
including surcharge storage:

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the  
Reservoir perimeter:

Location: \_\_\_\_\_

Elevation: \_\_\_\_\_

Reservoir:

Length @ Maximum Pool \_\_\_\_\_ (Miles)

Length of Shoreline (@ Spillway Crest) \_\_\_\_\_ (Miles)



PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS  
HUTCHINSON HYDROGRAPH AT  
HUTCHINSON HYDROGRAPH TO  
END OF NETWORK



NEW YORK STATE  
DEPT OF ENVIRONMENTAL CONSERVATION  
FLOOD PROTECTION BUREAU

1.000 HYDROGRAPH PACKAGE (HC-1)  
1.000 HYDROGRAPH PACKAGE (HC-1)  
LAST MODIFICATION 26 FEB 79  
MODIFIED FOR KENNEL APR 79

NEW YORK STATE

GUSHEN RESERVOIR  
PHASE 1  
PMF

NO NHK PMTA IDAY ITR INTR M TAC IPLT IPRT NSTAN  
200 0 10 0 0 0 0 0 0 0 0 0  
JUPER VJT LRPT TRACE  
5 0 0 0

MULTI-PLAN ANALYSES TO BE PERFORMED

WIDSE 0.20 0.40 0.60 0.80 1.00  
PLAN=1 WIDTH=5.00

SUR-AREA RUNOFF COMPUTATION

INFLOW FROM BASIN  
ISTAO 1 ICOMP 0 ITCOV 0 ITAPE 0 JPLT 2 IJRT 0 IYAME 1 IYAGE 1 IYATO 0

HYDROGRAPH DATA

INVOG IUNG IAKA SVAP TRDA TRSP2 RATIO ISAM ISAME LOCAL  
1 1 0.55 0. 0.55 0.55 0.55 0. 0. 0. 0.

PRECIP DATA

SPFE PPS RPT R12 R24 R36 R42 R48  
0. 21.50 111.00 123.90 131.00 142.00 0. 0.

LOSS DATA

LRPT STKR OLKRP RTOL FRAT STKR RT OR SIRT CISC ALSM RTAP  
0 0. 0. 1.00 0. 0. 1.00 1.00 0.10 0. 0.

UNIT HYDROGRAPH DATA

TP= 0.00 CP=0.53 RTA= 0

PRECIPITATION DATA

STRIPE -2.00 PRESNE -0. 0 PTHRE 1.00  
PLAN=1 WIDTH=5.00

UNIT HYDROGRAPH 30 AND 60 PERIOD UNIT AFTER EACH 0.01 HOURS, CUMULATIVE VOLUME 1.00  
1. 1.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 19.00 20.00 21.00 22.00 23.00 24.00 25.00 26.00 27.00 28.00 29.00 30.00 31.00 32.00 33.00 34.00 35.00 36.00 37.00 38.00 39.00 40.00 41.00 42.00 43.00 44.00 45.00 46.00 47.00 48.00 49.00 50.00 51.00 52.00 53.00 54.00 55.00 56.00 57.00 58.00 59.00 60.00 61.00 62.00 63.00 64.00 65.00 66.00 67.00 68.00 69.00 70.00 71.00 72.00 73.00 74.00 75.00 76.00 77.00 78.00 79.00 80.00 81.00 82.00 83.00 84.00 85.00 86.00 87.00 88.00 89.00 90.00 91.00 92.00 93.00 94.00 95.00 96.00 97.00 98.00 99.00 100.00

[illegible]

1.01	11.00	66	0.00	0.	1.00	1.	0.	0.	210	0.05	0.03	0.02	72.
1.01	11.10	67	0.00	0.	0.00	1.	0.	0.	211	0.05	0.03	0.02	72.
1.01	11.20	68	0.00	0.	0.00	1.	0.	0.	212	0.05	0.03	0.02	72.
1.01	11.30	69	0.00	0.	0.00	1.	0.	0.	213	0.05	0.03	0.02	72.
1.01	11.40	70	0.00	0.	1.00	1.	0.	0.	214	0.05	0.03	0.02	72.
1.01	11.50	71	0.00	0.	0.00	1.	0.	0.	215	0.05	0.03	0.02	72.
1.01	12.00	72	0.00	0.	0.00	1.	0.	0.	216	0.05	0.03	0.02	72.
1.01	12.10	73	0.02	0.	0.02	1.	0.	0.	217	0.27	0.25	0.02	77.
1.01	12.20	74	0.02	0.	0.02	1.	0.	0.	218	0.27	0.25	0.02	92.
1.01	12.30	75	0.02	0.	0.02	1.	0.	0.	219	0.27	0.25	0.02	121.
1.01	12.40	76	0.02	0.	0.02	1.	0.	0.	220	0.27	0.25	0.02	165.
1.01	12.50	77	0.02	0.	0.02	1.	0.	0.	221	0.27	0.25	0.02	226.
1.01	13.00	78	0.02	0.	0.02	1.	0.	0.	222	0.27	0.25	0.02	278.
1.01	13.10	79	0.02	0.	0.02	1.	0.	0.	223	0.32	0.30	0.02	333.
1.01	13.20	80	0.02	0.	0.02	1.	0.	0.	224	0.32	0.30	0.02	381.
1.01	13.30	81	0.02	0.	0.02	1.	0.	0.	225	0.32	0.30	0.02	424.
1.01	13.40	82	0.02	0.	0.02	1.	0.	0.	226	0.32	0.30	0.02	464.
1.01	13.50	83	0.02	0.	0.02	1.	0.	0.	227	0.32	0.30	0.02	502.
1.01	14.00	84	0.02	0.	0.02	1.	0.	0.	228	0.32	0.30	0.02	536.
1.01	14.10	85	0.03	0.	0.03	1.	0.	0.	229	0.40	0.38	0.02	566.
1.01	14.20	86	0.03	0.	0.03	1.	0.	0.	230	0.40	0.38	0.02	595.
1.01	14.30	87	0.03	0.	0.03	1.	0.	0.	231	0.40	0.38	0.02	626.
1.01	14.40	88	0.03	0.	0.03	1.	0.	0.	232	0.40	0.38	0.02	658.
1.01	14.50	89	0.03	0.	0.03	1.	0.	0.	233	0.40	0.38	0.02	690.
1.01	15.00	90	0.03	0.	0.03	1.	0.	0.	234	0.40	0.38	0.02	722.
1.01	15.10	91	0.02	0.	0.02	1.	0.	0.	235	0.36	0.35	0.02	750.
1.01	15.20	92	0.04	0.	0.04	1.	0.	0.	236	0.61	0.59	0.02	775.
1.01	15.30	93	0.07	0.	0.07	1.	0.	0.	237	1.09	1.08	0.02	815.
1.01	15.40	94	0.13	0.	0.13	1.	0.	0.	238	2.73	2.72	0.02	821.
1.01	15.50	95	0.05	0.	0.05	1.	0.	0.	239	0.73	0.77	0.02	1116.
1.01	16.00	96	0.03	0.	0.03	1.	0.	0.	240	0.49	0.47	0.02	1358.
1.01	16.10	97	0.03	0.	0.03	1.	0.	0.	241	0.37	0.36	0.02	1584.
1.01	16.20	98	0.03	0.01	0.02	1.	0.	0.	242	0.37	0.35	0.02	1741.
1.01	16.30	99	0.03	0.01	0.02	1.	0.	0.	243	0.37	0.35	0.02	1789.
1.01	16.40	100	0.03	0.01	0.02	1.	0.	0.	244	0.37	0.35	0.02	1713.
1.01	16.50	101	0.03	0.01	0.02	1.	0.	0.	245	0.37	0.35	0.02	1573.
1.01	17.00	102	0.03	0.01	0.02	1.	0.	0.	246	0.37	0.35	0.02	1437.
1.01	17.10	103	0.02	0.00	0.02	1.	0.	0.	247	0.29	0.28	0.02	1320.
1.01	17.20	104	0.02	0.00	0.02	1.	0.	0.	248	0.29	0.28	0.02	1231.
1.01	17.30	105	0.02	0.00	0.02	1.	0.	0.	249	0.29	0.28	0.02	1133.
1.01	17.40	106	0.02	0.00	0.02	1.	0.	0.	250	0.29	0.28	0.02	1044.
1.01	17.50	107	0.02	0.00	0.02	1.	0.	0.	251	0.29	0.28	0.02	983.
1.01	18.00	108	0.02	0.00	0.02	1.	0.	0.	252	0.29	0.28	0.02	920.
1.01	18.10	109	0.00	0.	0.00	1.	0.	0.	253	0.02	0.01	0.02	861.
1.01	18.20	110	0.00	0.	0.00	1.	0.	0.	254	0.02	0.01	0.02	799.
1.01	18.30	111	0.00	0.	0.00	1.	0.	0.	255	0.02	0.01	0.02	727.
1.01	18.40	112	0.00	0.	0.00	1.	0.	0.	256	0.02	0.01	0.02	643.
1.01	18.50	113	0.00	0.	0.00	1.	0.	0.	257	0.02	0.01	0.02	552.
1.01	19.00	114	0.00	0.	0.00	1.	0.	0.	258	0.02	0.01	0.02	461.
1.01	19.10	115	0.00	0.	0.00	1.	0.	0.	259	0.02	0.01	0.02	373.
1.01	19.20	116	0.00	0.	0.00	1.	0.	0.	260	0.02	0.01	0.02	312.
1.01	19.30	117	0.00	0.	0.00	1.	0.	0.	261	0.02	0.01	0.02	256.
1.01	19.40	118	0.00	0.	0.00	1.	0.	0.	262	0.02	0.01	0.02	212.
1.01	19.50	119	0.00	0.	0.00	1.	0.	0.	263	0.02	0.01	0.02	175.
1.01	20.00	120	0.00	0.	0.00	1.	0.	0.	264	0.02	0.01	0.02	149.
1.01	20.10	121	0.00	0.	0.00	1.	0.	0.	265	0.02	0.01	0.02	129.
1.01	20.20	122	0.00	0.	0.00	1.	0.	0.	266	0.02	0.01	0.02	119.
1.01	20.30	123	0.00	0.	0.00	1.	0.	0.	267	0.02	0.01	0.02	119.
1.01	20.40	124	0.00	0.	0.00	1.	0.	0.	268	0.02	0.01	0.02	119.
1.01	20.50	125	0.00	0.	0.00	1.	0.	0.	269	0.02	0.01	0.02	119.
1.01	21.00	126	0.00	0.	0.00	1.	0.	0.	270	0.02	0.01	0.02	119.
1.01	21.10	127	0.00	0.	0.00	1.	0.	0.	271	0.02	0.01	0.02	119.
1.01	21.20	128	0.00	0.	0.00	1.	0.	0.	272	0.02	0.01	0.02	119.

1.01	21.80	130	0.00	0.	0.00	1.	0.	2/4	0.02	0.01	0.02	179.
1.01	21.90	131	0.00	0.	0.00	1.	0.	2/5	0.02	0.01	0.02	179.
1.01	22.00	132	0.00	0.	0.00	1.	0.	2/6	0.02	0.01	0.02	179.
1.01	22.10	133	0.00	0.	0.00	1.	0.	2/7	0.02	0.01	0.02	179.
1.01	22.20	134	0.00	0.	0.00	1.	0.	2/8	0.02	0.01	0.02	179.
1.01	22.30	135	0.00	0.	0.00	1.	0.	2/9	0.02	0.01	0.02	179.
1.01	22.40	136	0.00	0.	0.00	1.	0.	2/10	0.02	0.01	0.02	179.
1.01	22.50	137	0.00	0.	0.00	1.	0.	2/11	0.02	0.01	0.02	179.
1.01	23.00	138	0.00	0.	0.00	1.	0.	2/12	0.02	0.01	0.02	179.
1.01	23.10	139	0.00	0.	0.00	1.	0.	2/13	0.02	0.01	0.02	179.
1.01	23.20	140	0.00	0.	0.00	1.	0.	2/14	0.02	0.01	0.02	179.
1.01	23.30	141	0.00	0.	0.00	1.	0.	2/15	0.02	0.01	0.02	179.
1.01	23.40	142	0.00	0.	0.00	1.	0.	2/16	0.02	0.01	0.02	179.
1.01	23.50	143	0.00	0.	0.00	1.	0.	2/17	0.02	0.01	0.02	179.
1.01	0.	144	0.00	0.	0.00	1.	0.	2/18	0.02	0.01	0.02	179.
SUM 21.46 15.84 3.21 41911.										( 20.3) ( 28.3) ( 92.3) ( 1186.79)		

PEAK	5-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
1789.	919.	289.	145.	91953.
51.	25.	8.	4.	1185.
CFS	14.36	18.01	18.33	18.33
CMH	364.02	462.21	465.59	465.59
INCHES	451.	572.	576.	576.
AC-FI	567.	705.	711.	711.
THOUS CU N				

# STARTS 1

[illegible]



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1631900.  
1631900.

3.211.1  
3.501.31  
3.491.2.1

10-10-1  
10-16-1  
10-21-1

21.201291  
21.301291  
21.401391  
21.501491

145103  
145102  
145101  
145100  
145099

00.5015.1  
02.4015.1  
00.5015.1

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2. 0.013.1  
3. 0.014.1

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114750  
114760  
114770

U.S. 4104:1  
U.S. 4105:1  
U.S. 4106:1

1.16:11  
1.26:11  
1.36:11

100-100-1  
100-100-1  
100-100-1

1961  
1962  
1963

11-101-1  
11-130-1  
11-105-1

5.2E1.41  
5.5C1.51  
5.4C1.11  
5.5C1.11

9.301,34  
9.001,34  
9.101,34  
9.201,34

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2. JUL 11 1961  
3. JUL 11 1961

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5.1017  
5.201741

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6.30134  
6.30135

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	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL
CF3	358.	182.	59.	24.	831.
CN3	10.	0.	0.	1.	237.
INCHES		2.87	3.54	3.67	3.67
MM		72.92	92.44	93.12	93.12
AC-FI		90.	119.	113.	115.
THOUS CU M		111.	141.	142.	142.

[illegible]











## STATION 1. P-M 1. RAYID 3

[illegible]

**STORAGE**

[illegible]







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20.501251

21.101261

21.201271

21.301281

21.401291

21.501301

21.601311

21.701321

21.801331

21.901341

22.101351

22.201361

22.301371

22.401381

22.501391

22.601401

22.701411

22.801421

22.901431

23.101441

23.201451

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23.401471

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23.601491

23.701501

23.801511

23.901521

24.101531

24.201541

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24.401561

24.501571

24.601581

24.701591

24.801601

24.901611

25.101621

25.201631

25.301641

25.401651

25.501661

25.601671

25.701681

25.801691

25.901701

26.101711





STATION 1, PLAIN 1, RATIC 1

END-OF-PERIOD HYDROGRAPH ORIGINATES

[illegible]

**SUMMARY**

[illegible]





INFLUENCE, (CYCLOC) AND RESERVED -LOTTA)

[illegible]



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**Figure 7**

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[illegible]

PEAK FLOW AND STORAGE (END OF PIPED) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)  
 AREA IN SQUARE FEET (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN RATIO	RATIOS APPLIED TO FLOWS					
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
ADDITIONAL	1	0.59	1	0.20	0.40	0.50	0.50	0.80	1.00
	( 1798.09 )			358.	716.	895.	1074.	1431.	1789.
ADDITIONAL	1	0.59	1	10.13	20.27	25.33	30.40	40.53	50.67
	( 1798.09 )			103.	255.	338.	555.	809.	1466.
ADDITIONAL	1	0.59	1	2.93	7.21	9.57	15.72	28.57	41.53
	( 1798.09 )			103.	255.	338.	555.	809.	1466.

# SUMMARY OF DAM SAFETY ANALYSIS

PLAY 1 .....		INITIAL VALUE		SPILLWAY CREST		TOP OF DAM	
ELEVATION		701.		543.00		545.00	
STORAGE		0.		734.		867.	
OUTFLOW		0.		0.		543.	
RATIO OF	MAXIMUM RESERVOIR W-S-ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.20	548.34	0.	777.	103.	0.	42.83	0.
0.40	545.46	0.	837.	255.	0.	42.67	0.
0.50	545.97	0.	865.	338.	0.	42.67	0.
0.60	546.27	0.27	882.	555.	2.50	42.00	0.
0.80	546.62	0.62	901.	1009.	3.50	41.33	0.
1.00	546.85	0.89	915.	1466.	4.17	41.00	0.

APPENDIX 0

REFERENCES



## APPENDIX D

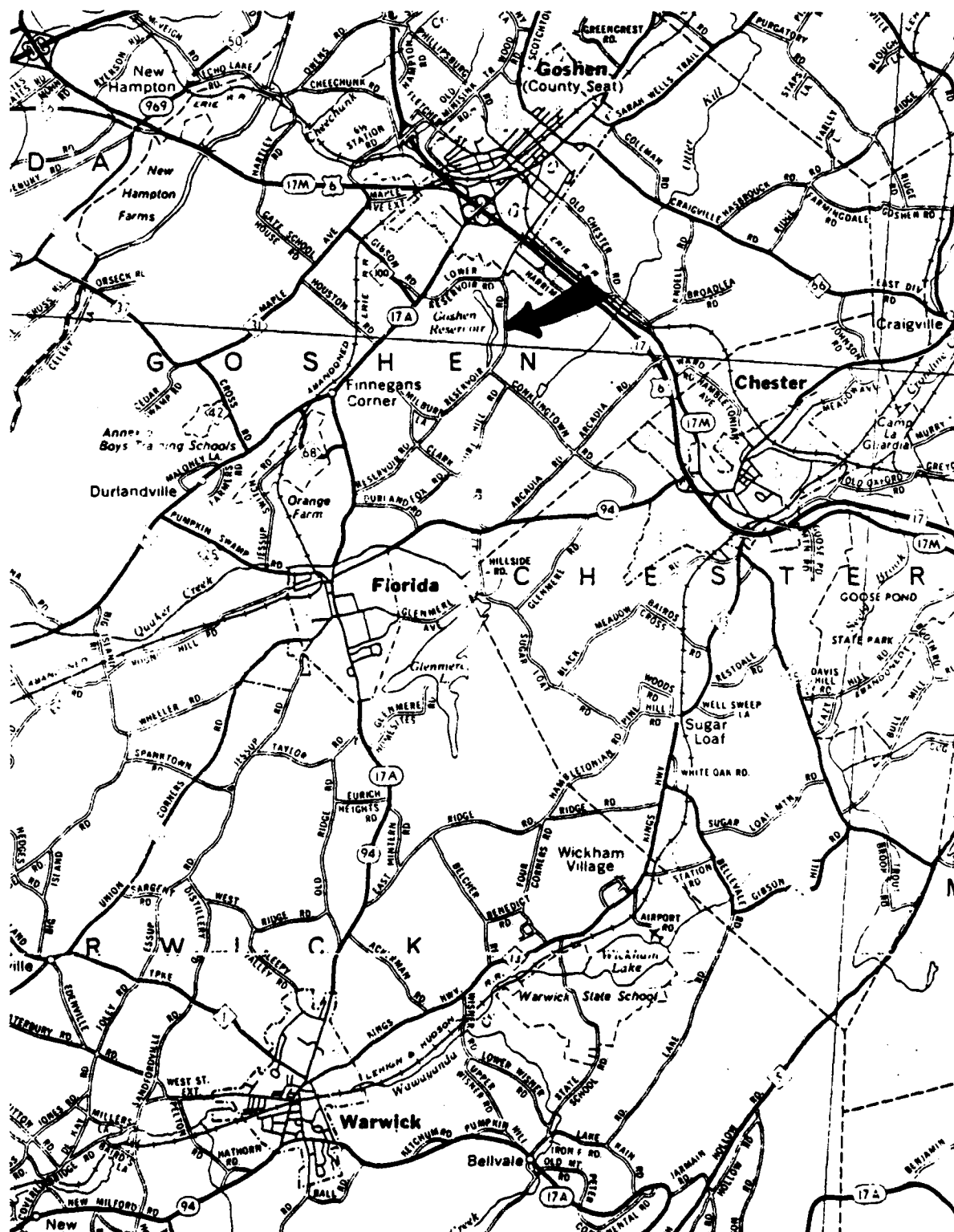
### REFERENCES

- 1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.
- 2) U.S. Department of Commerce, Hydrometeorological Report No. 33, Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1,000 Square Miles and Durations of 6, 12, 24, and 48 Hours; April 1956.
- 3) Soil Conservation Service, National Engineering Handbook, Section 4, Hydrology, August 1972 (U.S. Department of Agriculture),
- 4) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.
- 5) T.W. Lambe and R.V. Whitman, Soil Mechanics, John Wiley and Sons, 1965.
- 6) W.D. Thornbury, Principles of Geomorphology, John Wiley and Sons, 1969.
- 7) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.
- 8) Cornell University Agriculture Experiment Station (compiled by M.G. Cline and R.L. Marshall), General Soil Map of New York State and Soils of New York Landscapes, Information Bulletin 119, 1977,

APPENDIX E

DRAWINGS





VICINITY MAP

# TEST BORING REPORT

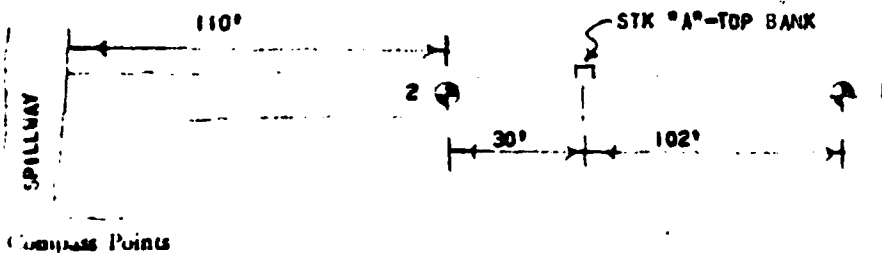
## RAYMOND

CONCRETE PILE DIVISION  
RAYMOND INTERNATIONAL INC.  
140 CEDAR STREET - NEW YORK 6, N. Y.

To CHUMARD & MC GOUGH  
Address 4 FAIRLAWN AVENUE, MIDDLETOWN, NEW YORK

Date JUNE 4 19 63

We have completed the following borings for you at EXISTING RESERVOIR DAM, VILLAGE OF GOSHEN, GOSHEN, N.Y.  
with results show below In accordance with your instructions, we ~~WILL SEND~~ WILL SEND labelled samples of the strata encountered  
To SAME AS ABOVE Address SAME AS ABOVE  
Via RAILWAY EXPRESS under date of JUNE, 1963 Raymond Concrete Pile Division  
Raymond International Inc. LOCATION PLAN SCALE 1" =



Compass Points



This boring report prepared in the  
NEW YORK OFFICE of the  
Raymond Concrete Pile Division  
RAYMOND INTERNATIONAL INC.

By CQ  
Job No. B C-2734  
Sheet 1 of 2

# TEST BORING REPORT

## RAYMOND

### CONCRETE PILE COMPANY GOW DIVISION

To CHUMARD & MC SOUGH

Date JUNE 4, 1963

Location of Borings GOSHEN, NEW YORK

All borings are plotted to scale of 1" = 8 ft. using ELEVATIONS TAKEN FROM PRINT as a fixed datum.  
SUPPLIED BY CLIENT

Boring No. 1

Boring No. 2

Boring No. \_\_\_\_\_

ELEV. 100.89' ±

0.0	FINE BRN SAND, GRAVEL & SOME BOULDERS		36
4.0			42
(WL) 6.0 (12)	FINE BROWN SAND, SOME GRAVEL & CLAY	12	50
		14	54
		7	20
17.0			16
			19
			17
			12
			10
			9
			8
			8
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			7
			12
			13
			10
			11
			7
32.5			13
			14
			39
34.5			54
	FINE BRN SANDY CLAY & SHALE	100/6	

ELEV. 100.82' ±

0.0	SAND, GRAVEL & BOULDERS		32
4.0			46
(WL) 6.0 (12)			54
			39
			20
			16
			14
			11
			11
			9
			8
			7
			10
			7
			6
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19.0			10
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			12
37.0			16
			22
40.0			
	FINE BRN SANDY CLAY & SOME GRAVEL	19	

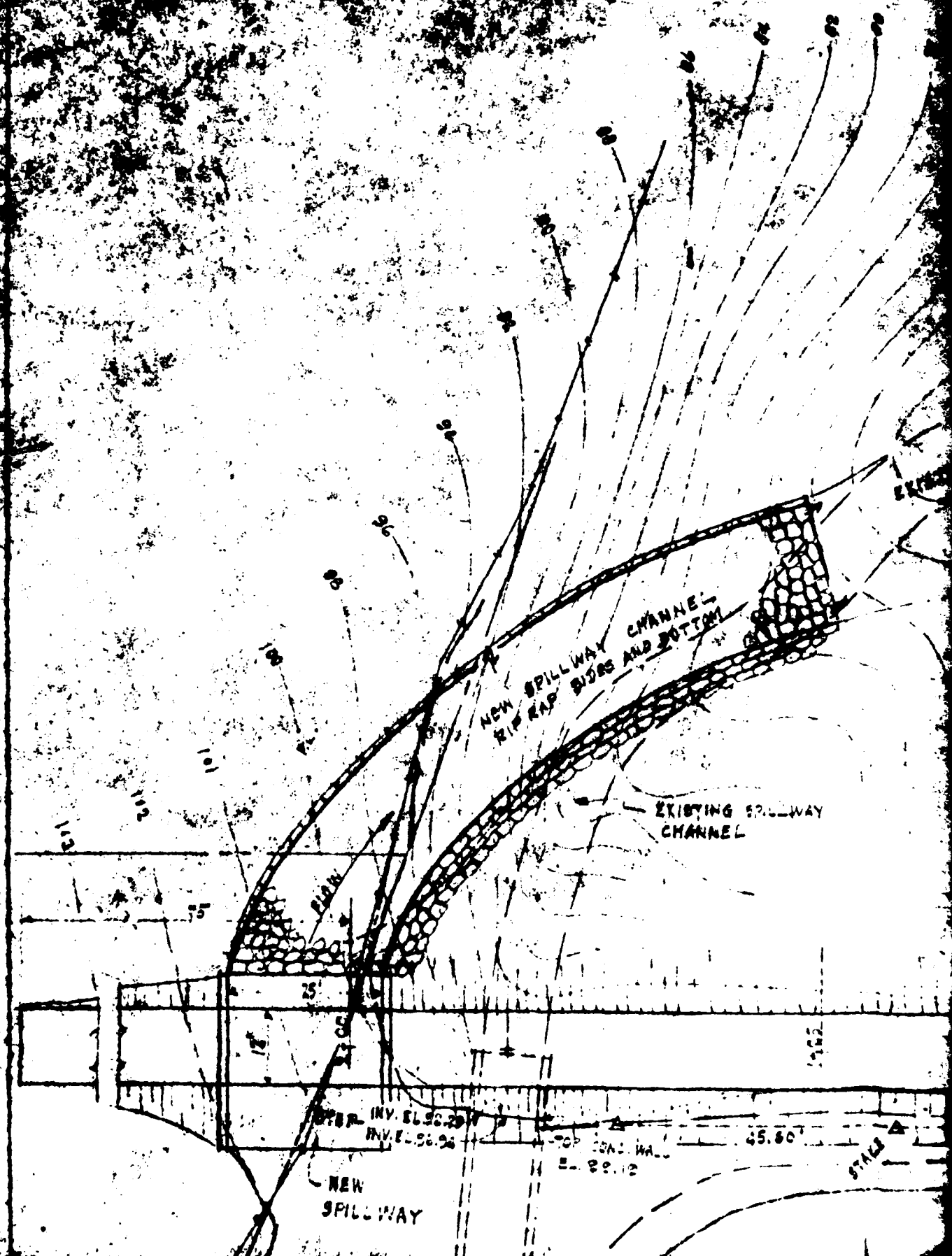
GENERAL NOTE: NUMBERS ON EXTREME RIGHT OF COLUMN INDICATE NUMBER OF BLOWS REQUIRED  
TO DRIVE 2 1/2" CASING ONE FOOT, USING 350 LB WEIGHT FALLING 18"

Classifications are made from visual inspection.

Water Levels (WL). Figure indicates time of reading (hours) after completion of boring. Water levels indicated are those observed when borings were made, or as noted. Porosity of the soil stratas, variations of rainfall, site topography, etc., may cause changes in these levels.

Figures in right hand column indicate number of blows required to drive 2" O. D. sampling pipe one foot, using a 140 lb. weight falling 30 inches.

Total Footage 74.5'  
Foreman WATTERS  
Classifications by WJ/MB  
Job No. B E-2734  
Sheet 2 of 2



EXISTING CHANNEL

2' TOP OF SLOPE

REMOVE EXISTING  
GRUB AND CL

TOP OF  
PROPOSED DAM

EL. 105.00

BASE LINE 3.86'  
POINT "O" ON  
PROFILE BELOW



60

70

72

74

76

EXISTING  
D.C.

MALEBARI

ROAD

9.85

26.75

6.45

14.00

10.25

12.15

EL. 05.00

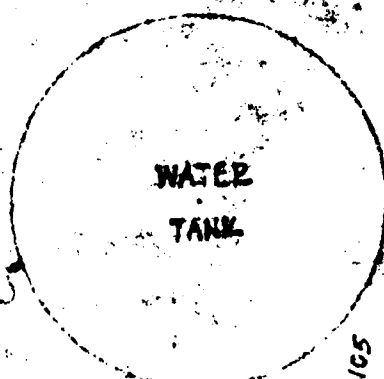
22.00

RELOCATE  
DOCK HERE

NEW SPICE LINE  
WATER - 2.12.00

BENCH MARK

NEW DOCK



CONCRETE  
BASE EL. 99.42

CLEAR AND GRUB  
THIS AREA

TOP EL. 105.00

NEW CONCRETE FLOOR

NEW HIGH  
WATER LINE

TOP OF NEW  
ENCLOSURE WALL  
EL. 105.00

NEW GRADE

EXISTING GRADE

RELIGATE  
EXISTING DOOR WAYS

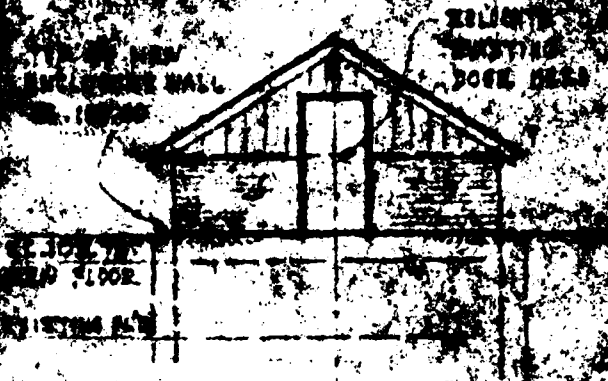
TOP OF NEW  
ENCLOSURE WALL  
EL. 105.00

EXISTING FLOOR

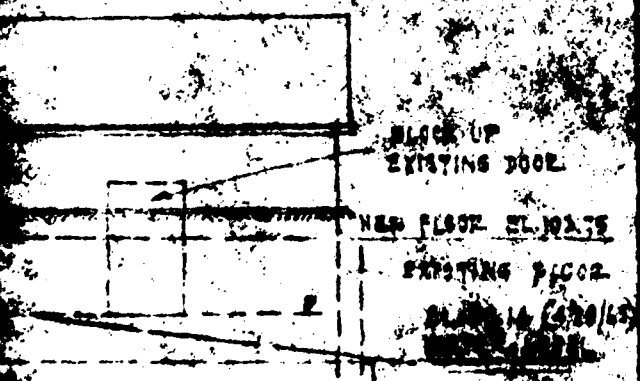
EXISTING GRADE

WEST ELEV

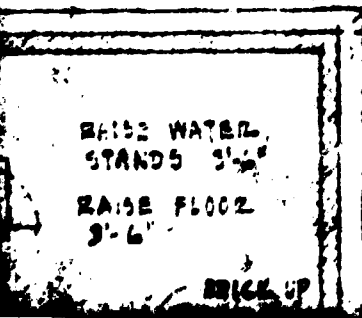
RAISE WATER  
STANDS 5'  
RAISE FLOOR  
3'-6"

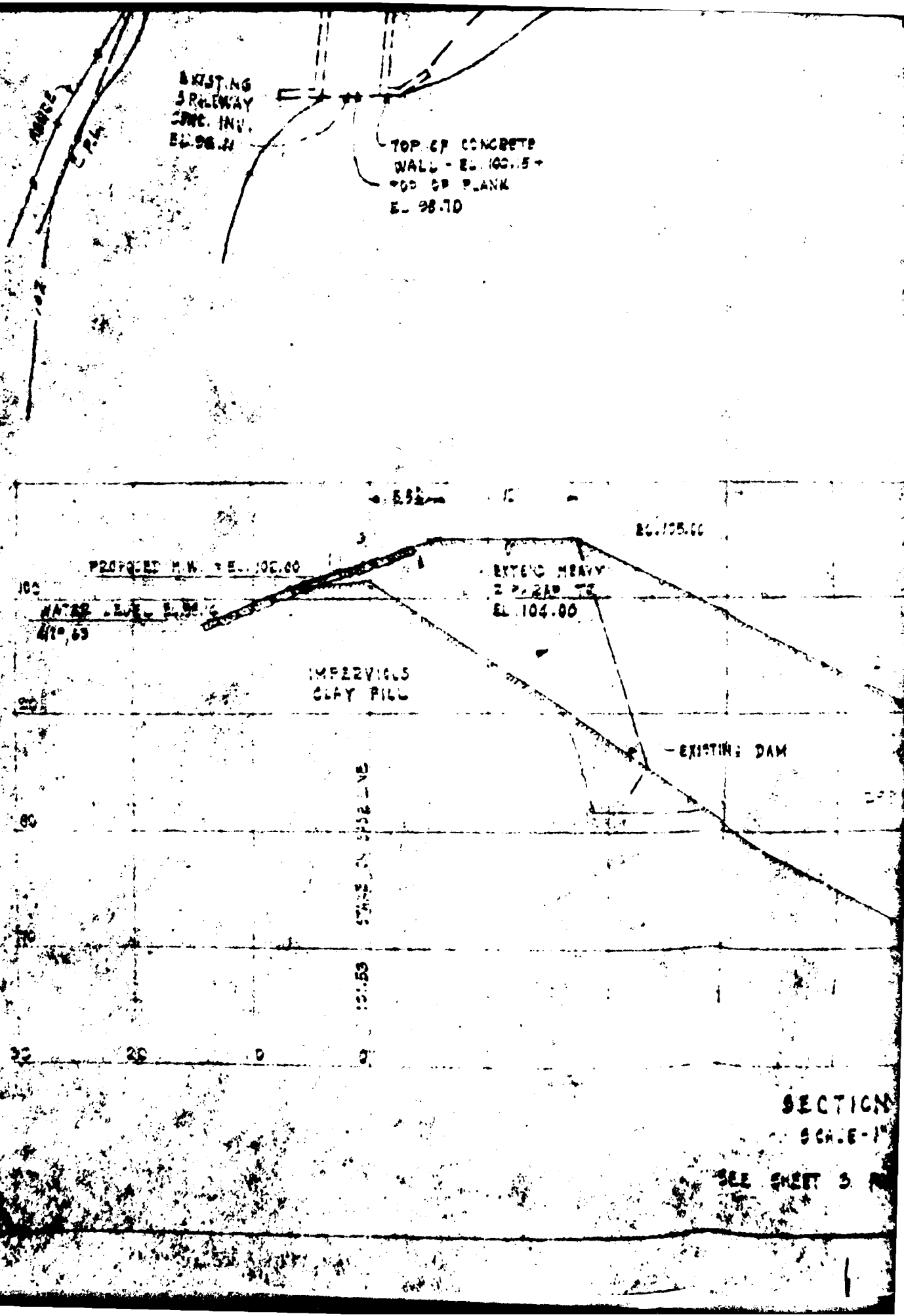


NORTH ELEVATION



WEST ELEVATION



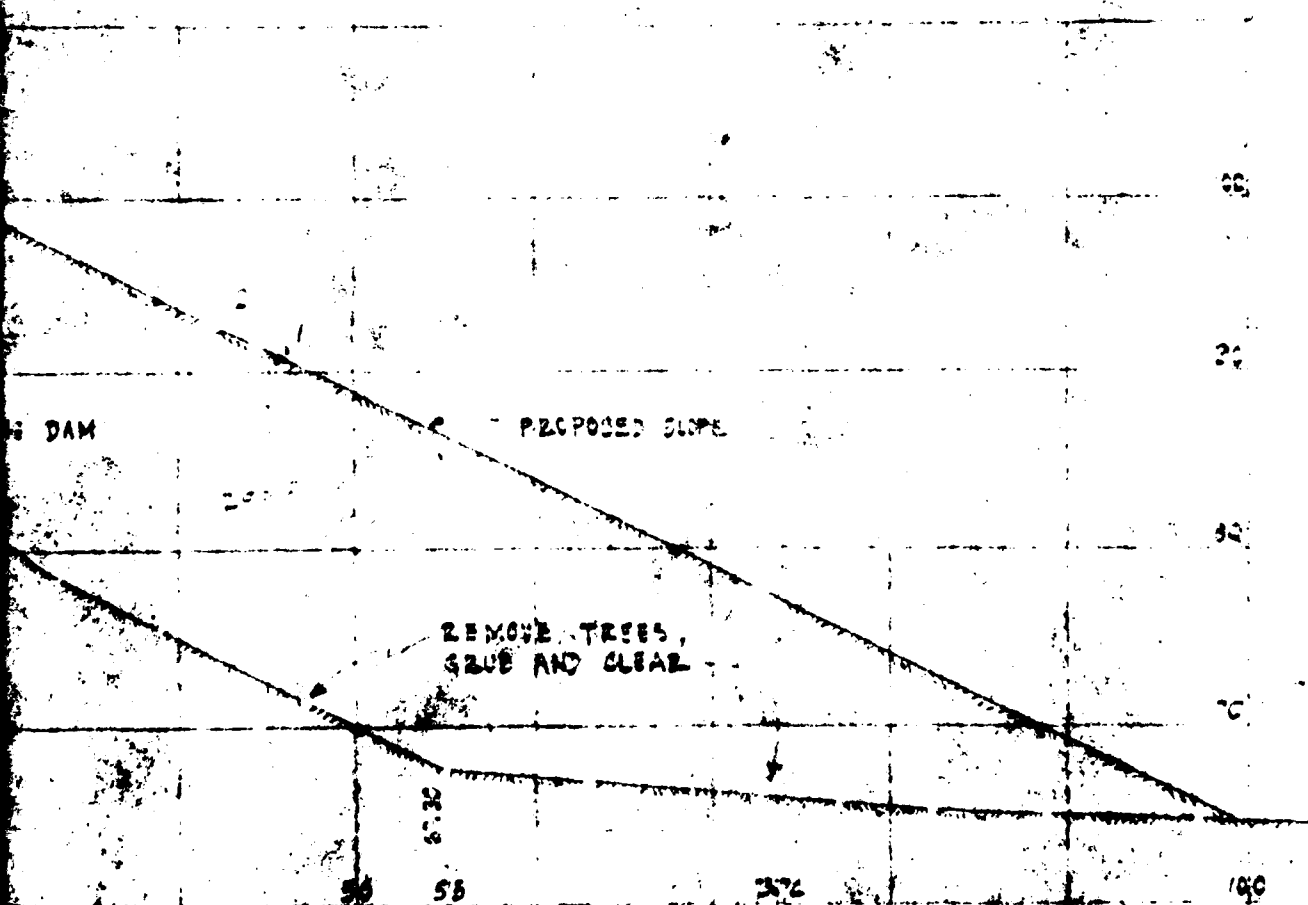


TOP OF  
EXISTING DAM

EXISTING  
LINE



GENERAL PLAN  
SCALE - 1" = 30'



SECTION A-A

SCALE - 1" = 10'

SEE SHEET 3 FOR OTHER SECTIONS

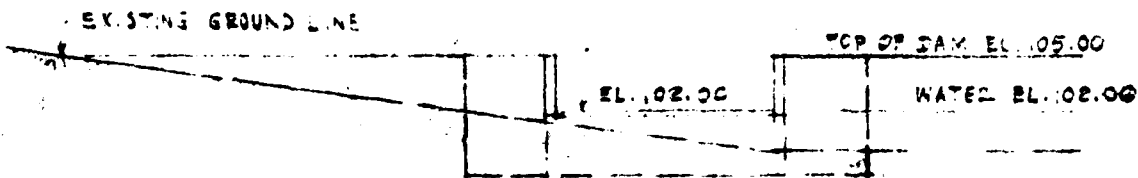
17

EXISTING FLOOR W.L. EL.  
LINE

EXISTING FLOOR W.L. EL. 100.00

EXISTING FLOOR W.L. EL.  
NEW FLOOR EL. 103.7  
SEE DETAILS

EXISTING  
GATE HOUSE



NEW SPILLWAY  
SCALE - 1" = 20'

1-8

STAGE EL. 100.5  
22 EL. 103.75  
STAGE 5

NEW CONCRETE  
ENCLOSURE WALL

EL. 105.00

83-18" C.C.  
EACH WAY

FLOOR PLAN

DETAIL AT GATE

SCALE - 1/8" = 1'-0"

DETAIL ENCLOSURE WALL

SCALE - 3/8" = 1'-0"

STATE OF NEW  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF CONSTRUCTION  
ALBANY, N. Y.


This plan for re-constructing  
Lower Hudson River  
approved under the provisions of  
Conservation Law.

Examined and recommended for  
approval.

ASSOCIATE

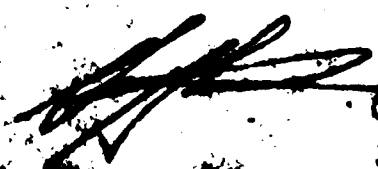
APPROVED

CH  
Department

By: 

INCREASING STORAGE CAPACITY  
PROSPECT RESERVOIR  
VILLAGE OF GOSHEN ORANGE COUNTY  
SCALE - STATED

ASSOCIATE - JOSEPH A. WESTNER JR.  
CONSULTING ENGINEER  
TROY, N. Y.



222, ENG2 BK 2  
B.C. 17

SHEET 1 OF 3

BRICK UP  
FOOTWAY

FLOOR PLAN

DETAIL AT GATE HOUSE

SCALE - 1/8" = 1'-0"

STATE OF NEW YORK  
DEPARTMENT OF PUBLIC WORKS  
DIVISION OF CONSTRUCTION  
ALBANY, N. Y.

This plan for re-constructing dam No. 174B-3163  
Lower Hudson River watershed is hereby  
approved under the provisions of Section 948 of the  
Conservation Law.

Examined and recommended to the Chief Engineer for  
approval.

*[Signature]*  
ASSOCIATE CIVIL ENGINEER

APPROVED

CHIEF ENGINEER  
Department of Public Works

By *[Signature]*  
Deputy Chief Engineer

STORAGE CAPACITY  
RESERVOIR

FOR

ORANGE COUNTY, N.Y.

MAY 13, 1963

*[Signature]*  
CRUMAZZ & MCGOUGH  
CONSULTING ENGINEERS  
4 FAIRLAWN AVE.  
MIDDLETOWN, N.Y.



6" PERFORATED  
COARSE SINKHOLE  
SEE DETAIL

6" CONCRETE SLAB  
W/ 2" MESH 6" x 6" @ 10" O.C.

10'-0"



FLOW

12

PERFORATED PIPE IN  
GRAVEL TRENCH  
DETAIL

10'-0"

2 A  
2 A

CONST. JOINT

PLAN

25'-0"

5'-0"

28'-0"

5'-0"

6'-0"

0'-0"

2 11 EAST

EL. 100.00

W. 25 WEST

NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13  
NATIONAL DAM SAFETY PROGRAM. GOSHEN RESERVOIR NUMBER 1 DAM (INV--ETC(U)  
AUG 81 G KOCH DACW51-79-C-0001

NL

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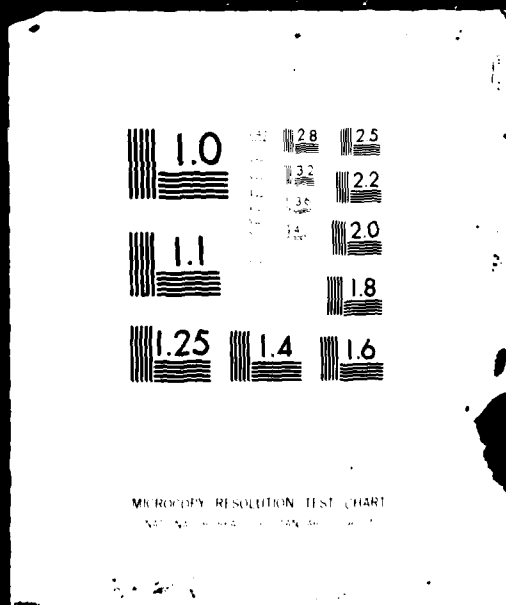
416

• 28 •

2 OF 2

AD A

109838



EASTN

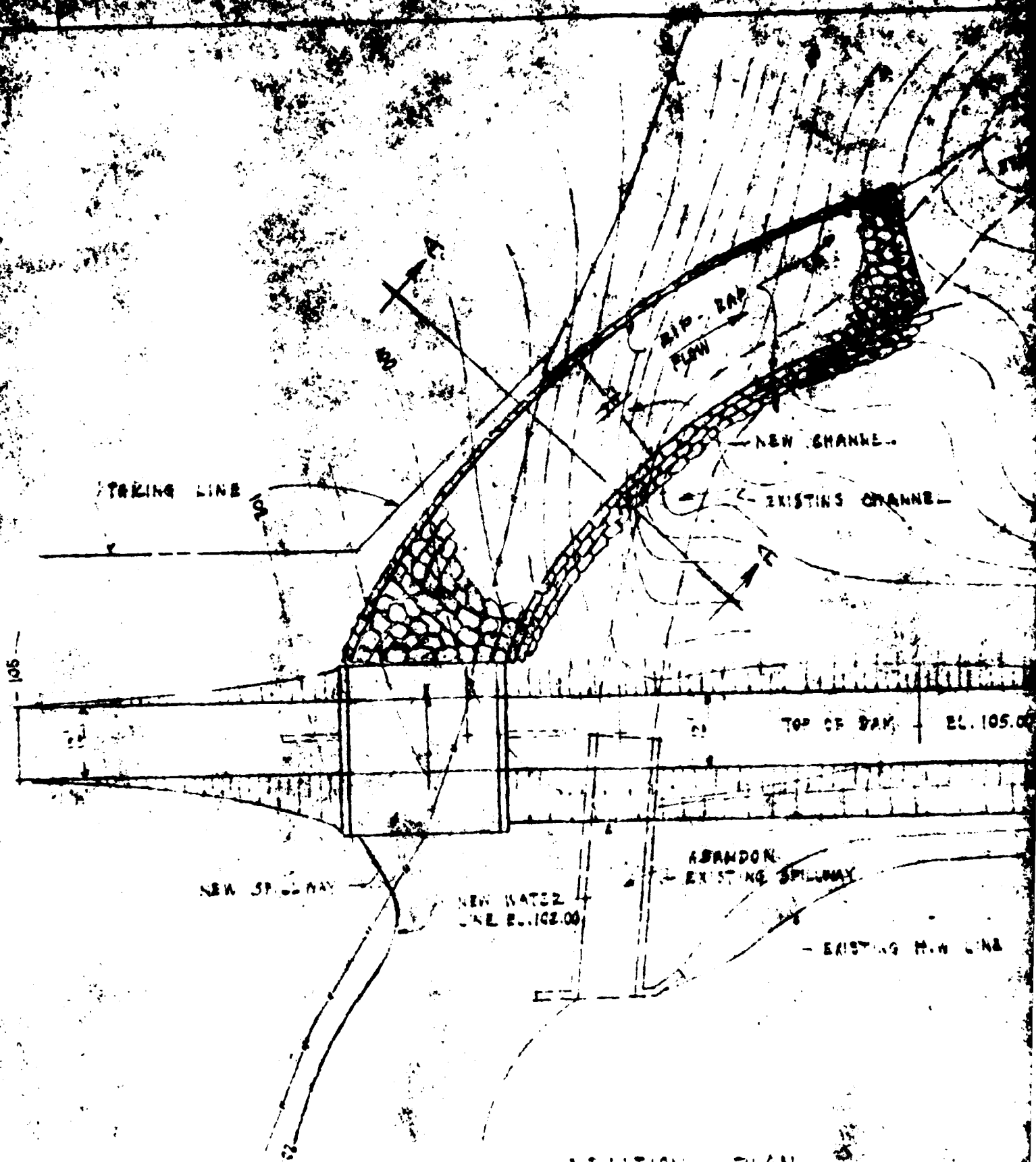
WIRE MESH  
100/100/100

13



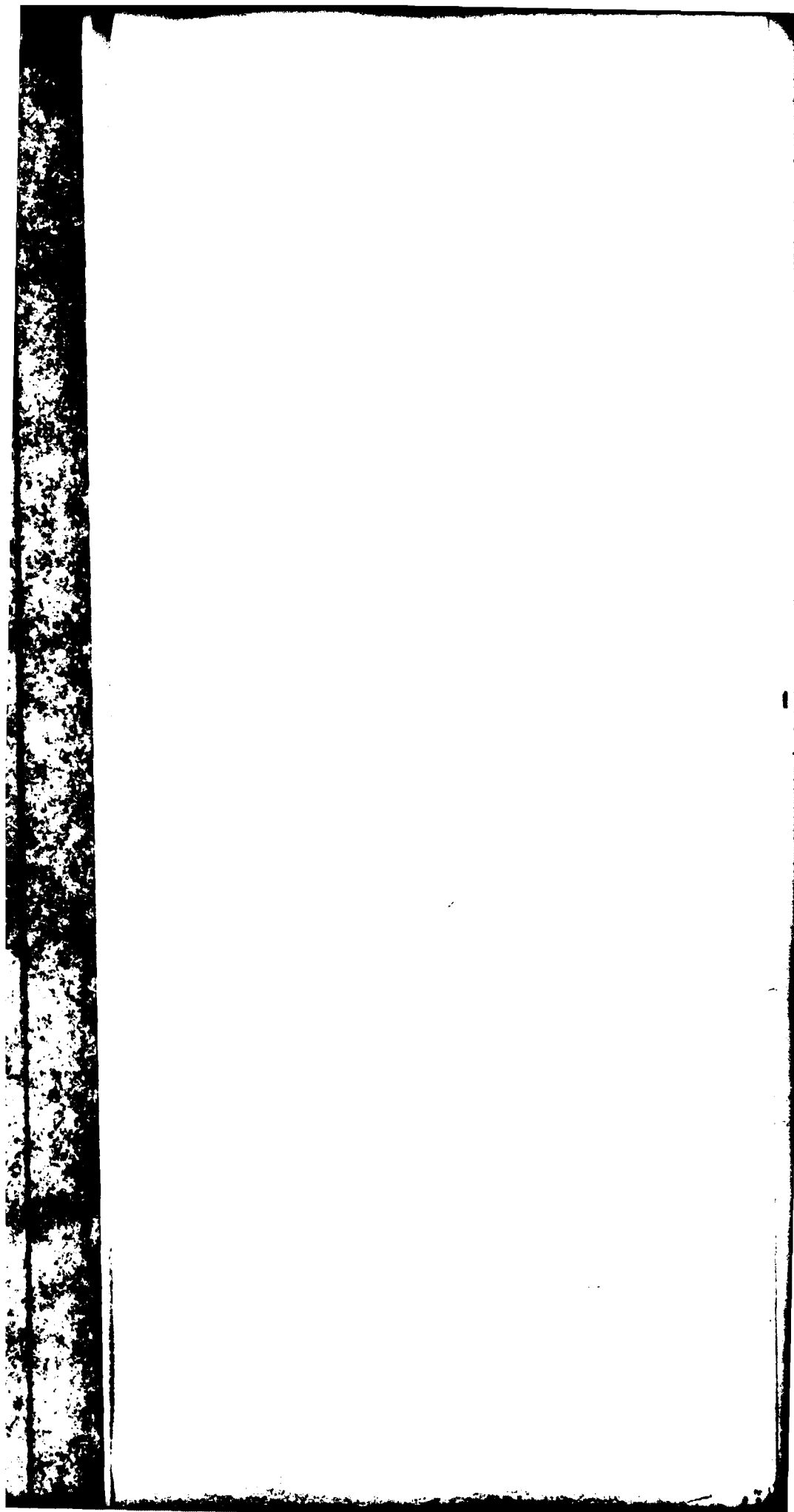
SECTION B-B

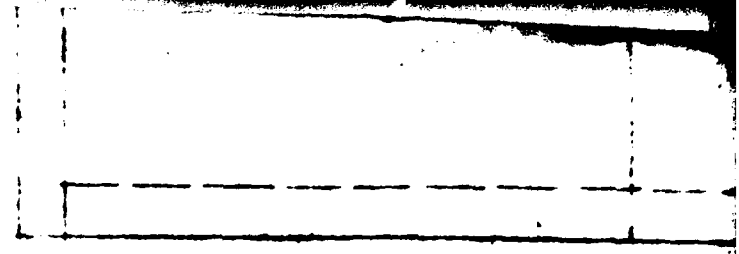
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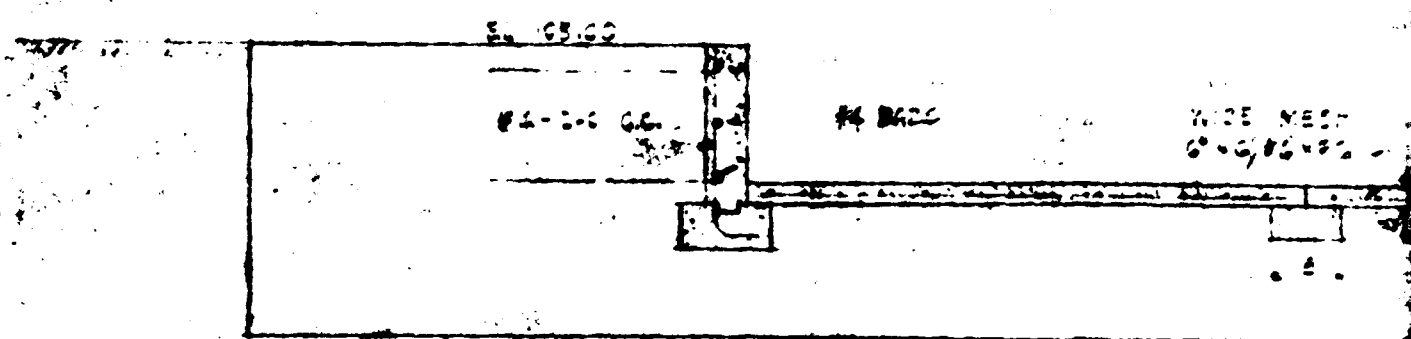
LOCATION PLAN

904.5-10-201





25-01  
27-01



WIRE MESH  
6x6 1/2x1/2



SECTION 2-2  
SCALE 1/4" = 1'-0"

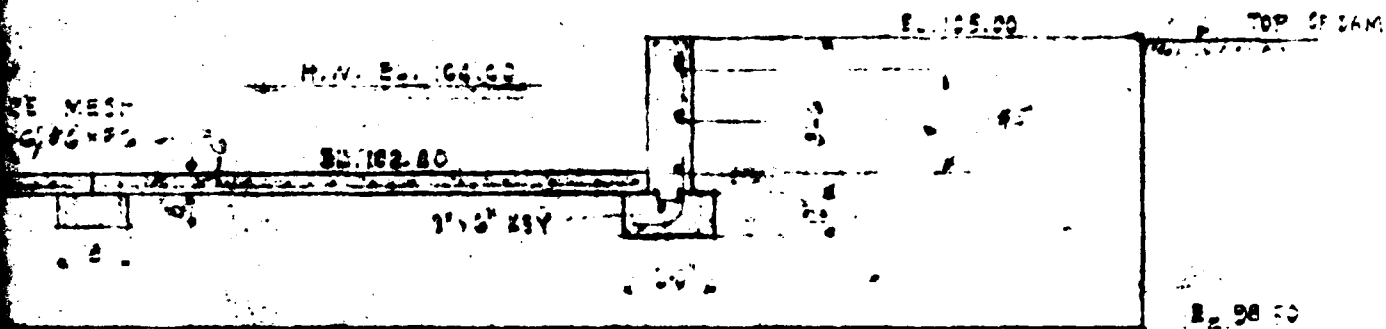


28-01

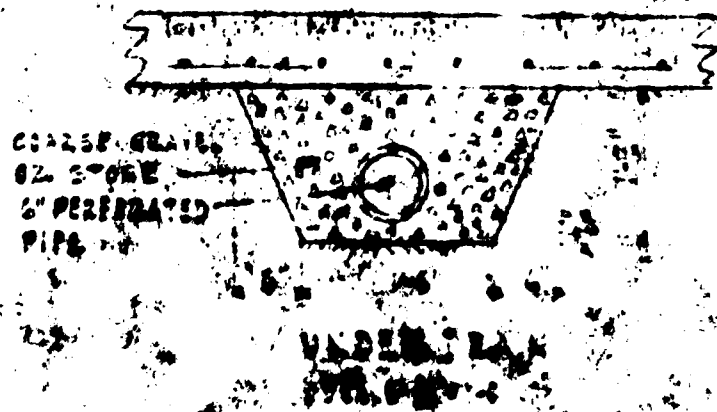
27-01

PLAN

SCALE 1"=1'-0"



SECTION



EXISTING

EARTH

S.P. 2AD

EL. 10.50

EL. 98.50

S.P. 2AD

SECTION A-A

SCALE 1/4" = 1'-0"

EXISTING SECOND LINE

TOP OF DAM E. 102.00

E. 102.00

COMPACT FILL

SATUM 100.00

SECTION ALONG C DAM

SCALE - VERT. 1" = 10'  
HORIZ. 1" = 20'

# INCREASING STORAGE CAPACITY PROSPECT RESERVOIR

VILLAGE OF GOSHEN ORANGE COUNTY

SCALE - STATED

ASSOCIATE - JOSEPH A. KESTNER JR.  
CONSULTING ENGINEER  
TRUY, N.Y.

REF. N. 84-17  
ENGR. B. 3

SHEET 2 OF 5

 CHUMA  
CONSULTING  
& ENGINEERING  
INC.

165.00  
SATUM 188.00

E. CAPACITY  
ERVOIR

NGE COUNTY, N.Y.

JUNE 1943

CHUMAZE & MCGOUGH  
CONSULTING ENGINEERS  
4 FAIRLAWN AVE.  
MIDDLETOWN, N.Y.